

NASA's MEaSUREs Program: Making Earth System Data Records for Use in Research Environments

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NASA Earth Science Data Systems

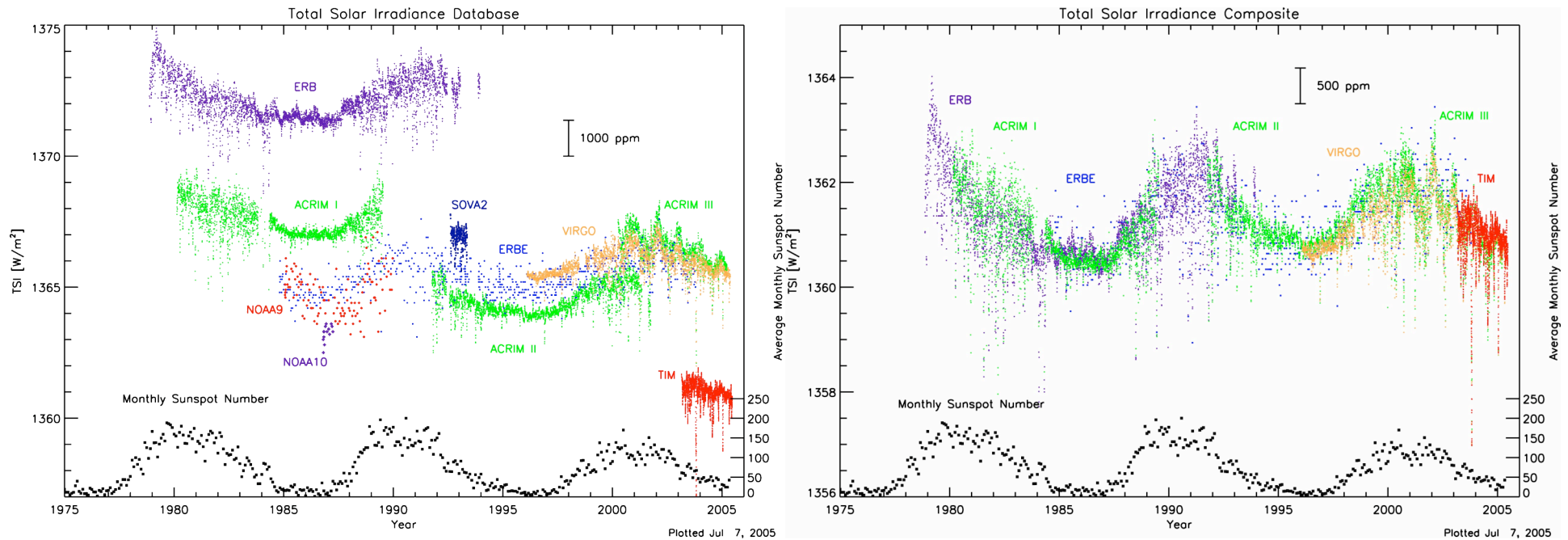
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NASA Earth Science Data and Information System Project

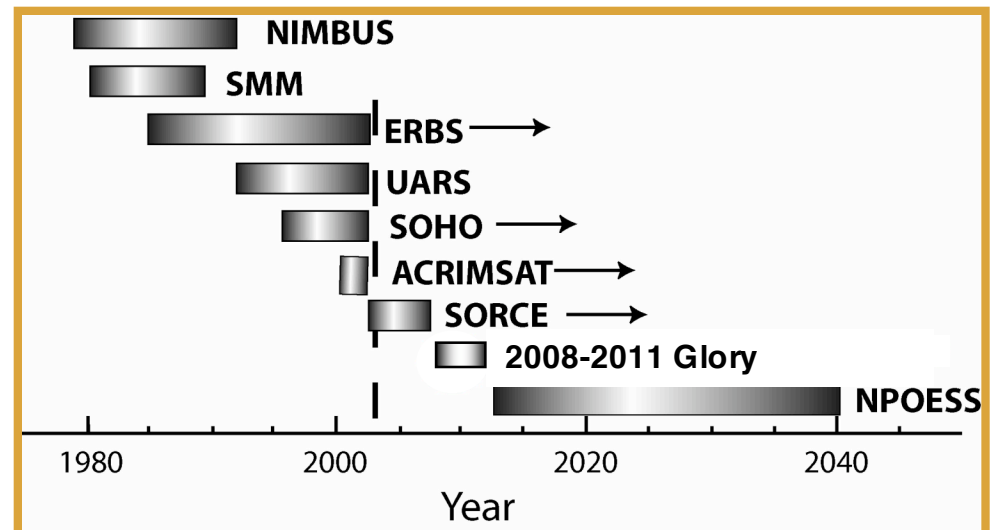
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NASA Mission Instrument Data and Measurement ESDRs



Total Solar Irradiance (TSI) measurements shown are existing 26 year record - precise data records from multiple sensors have been corrected for accuracy through data overlaps.





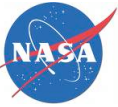
NASA Support for ESDRs Historically Strong

- **NASA institutionalized support for Earth Science Data Records (and Climate Data Records) in the EOS Program, and has continued support via multiple programs in Earth Science for generating and integrating data for science and applications.**
 - **EOS Pathfinder Data Set program, originally joint with NOAA (POES/GOES) and USGS (Landsat) 1991 - 1995**
 - **NASA Pathfinder Data Sets 1995-1997**
 - **Earth Science Information Partners (ESIPs), included research, education, and applications 1998-2002**
 - **Research, Education and Applications Solution Network (REASoN) 2002-2006**
 - **Making Earth System data records for Use in Research Environments (MEaSUREs) 2006-2010**



MEaSUREs Focus

- **A major need stated by the NASA Earth science research strategy is to develop long-term, consistent, and calibrated data and products that are valid across multiple missions and satellite sensors.**
- **An ESDR is defined as a unified and coherent set of observations of a given parameter of the Earth system, which is optimized to meet specific requirements in addressing science questions.**
- **For creating these basic records, a science measurement focus brings together expertise in multiple instrument characterization and calibration, data processing, science-based product generation and distribution, science tools, and interactive relationships with the broader science community.**
- **Selected MEaSUREs projects are focused on product generation, availability, and utility. Maturity of algorithm and cal/val activity research is a prerequisite for selection as a MEaSUREs project to embark on large-scale data production.**



MEaSURES - Project Requirements

- **Proposers must maintain a public WWW-compliant presence.**
- **Data and information shall be publicly available, preferably via Internet transfer.**
 - **A tailored Data Rights section has been applied to resultant Cooperative Agreements, under which scientific data and scientific software (software used for processing raw instrument data into scientific data) are exchanged without restriction as to their disclosure, use, or duplication.**
- **Responsible NASA Managers will ensure that project seeks guidance from community scrutiny and review of product quality and acceptability within Cooperative Agreement milestones.**
- **Projects support representation on one or more Earth Science Data System Working Groups to ensure community knowledge and collaboration.**
- **For more detailed information, see MEaSURES Program Website:**

<http://measures-projects.gsfc.nasa.gov/>



Alternate Data Rights for MEaSURES PIs Written to Ensure Conformance with NASA Data Policy

- **NASA Data and Information Policy promotes full and open sharing of all data with the research and applications communities, private industry, academia, and the general public**
- **Data exchange and access principles include no period of exclusive access to data (in this context the term ‘data’ includes observation data, metadata, products, information, algorithms, including scientific source code, documentation, models, images, and research results)**
- **“Data exchanged between NASA and Recipient under this Cooperative Agreement will be exchanged without restriction as to its disclosure, use, or duplication except as otherwise provided.... In particular, rights in Scientific Data, Scientific Computer Data Bases, and Scientific Software..”**
- **Scientific Data: Earth system science products, with accompanying metadata and quality assessments, made available through production or services provided by the project.**
- **Scientific Computer Data Base: Collection of Scientific Data**
- **Scientific Software: Scientific Software is that software (including source code) used for processing raw instrument Data into Scientific Data**



Earth Science Disciplines Covered by MEaSUREs

- **Atmospheric Dynamics**
- **Atmospheric Composition**
- **Land Cover**
- **Topography**
- **Solid Earth**
- **Ocean Biology**
- **Hydrology**
- **Cryosphere**
- **Climate Change**
- **Physical Oceanography**



MEaSURES Products and Data Centers

- **Algorithms to be used for generating ESDRs must be vetted by community**
- **Products generated by MEaSURES Projects will be stored and distributed to users from the projects for their duration**
- **“Final versions” of products will be migrated to a designated EOSDIS Data Center for archiving and distribution**
 - **Products to be migrated must be vetted through respective DAAC User Working Groups**
 - **No guarantee that all proposed products will qualify and find a “permanent home”**
- **Some projects had proposed collaborations with specific data centers (e.g., David Roy with USGS, Eric Rignot and Ian Joughin with NSIDC)**
- **NASA HQ has assigned responsibilities to Data Centers for specific MEaSURES projects’ products**
- **Next three charts show Data Center assignments**
 - **One of the first milestones for each MEaSURES Project is to establish contact with NASA-assigned Data Center**



MEaSUREs & Data Centers (1 of 3)

PI First name	PI Last name	Company name	Title	Program Scientist	Negotiated on telecon done?	Data Center
Ronald	Kwok	Jet Propulsion Laboratory	ESDR of small-scale kinematics of Arctic Ocean sea ice	Martin	Y	ASF
Kyle	McDonald	Jet Propulsion Laboratory	An Inundated Wetlands Earth System Data Record: Global Monitoring of Wetland Extent and Dynamics	Wickland	Y	TBD
Victor	Zlotnicki	California Institute of Technology	An Earth System Data Record of changes in Earth masses from GRACE, CHAMP and other satellites.	Labrecque	Y	PO.DAAC
Frank	Webb	JPL	SOLID EARTH SCIENCE ESDR SYSTEM	Labrecque	Y	CDDIS
Lucien	Froidevaux	Jet Propulsion Laboratory	GOZCARDS: Global OZone Chemistry And Related trace gas Data records for the Stratosphere	Jucks	Y	GES DISC
Richard	McPeters	NASA	Creating a Long Term Multi-Sensor Ozone Data Record	Jucks	Y	GES DISC
Christian	Kummerow	Colorado State University	A Long-Term Precipitation Dataset with Uncertainty Information	Kakar	Y	PPS
Jay	Herman	NASA/GSFC	Earth Surface and Atmospheric Reflectivity Since 1979 from Multiple Satellites (TOMS, SBUV, SBUV-2, OMI, SeaWiFS, NPP, and NPOESS)	Maring	Y	GES DISC
N. Christina	Hsu	NASA Goddard Space Flight Center	Long-Term Aerosol Data Records: Using Deep Blue to Synergize SeaWiFS, MODIS, AVHRR, and TOMS Observations	Maring	Y	GES DISC



MEaSUREs & Data Centers (2 of 3)

PI First name	PI Last name	Company name	Title	Program Scientist	Negotiation telecon done?	Data Center
Eric	Wood	Princeton University	Developing consistent Earth System Data Records for the global terrestrial water cycle.	Entin	Y	GES DISC/ NSIDC (Snow)
Chung-Lin	Shie	UMBC	Reprocessing of Goddard Satellite-based Surface Turbulent Fluxes (GSSTF) Data Set for Global Water and Energy Cycle Research	Entin	Y	GES DISC
Eric	Fetzer	Jet Propulsion Laboratory	A Multi-Sensor Water Vapor Climate Data Record Using Cloud Classification	Kakar	Y	GES DISC
Frank	Wentz	Remote Sensing Systems	Distributed Information Services: Climate/Ocean Products and Visualizations for Earth Research (DISCOVER) - Continuation of Project	Lindstrom	Y	GHRC/ NSIDC
William	Rossow	The City University of New York/The City College	Global Cloud Process Studies in the Context of Decadal Climate Variability: Enhancement and Continuation of Data Analysis for the International Satellite Cloud Climatology Project (ISCCP)	Anderson	Y	LaRC ASDC DAAC
Gao	Chen	NASA Langley Research Center	Creating a Unified Airborne Database for Assessment and Validation of Global Models of Atmospheric Composition	Crawford	Y	LaRC ASDC DAAC
Thomas	Vonder Haar	Science and Technology Corp.	Improvement of the NVAP Global Water Vapor Data Set for Climate, Hydrological, and Weather Studies	Kakar	Y	LaRC ASDC DAAC
John	Townshend	University of Maryland	Earth Science Data Records of Global Forest Cover Change	Gutman	Y	LP DAAC
Kamel	Didan	University of Arizona	Vegetation Phenology and Enhanced Vegetation Index Products from Multiple Long Term Satellite Data Records	Wickland	Y	LP DAAC
Michael	Kobrick	JPL	The Definitive Merged Global Digital Topographic Data Set	Labrecque	Y	LP DAAC



MEaSUREs & Data Centers (3 of 3)

PI First name	PI Last name	Company name	Title	Program Scientist	Negotiation telecon done?	Data Center
David	Robinson	Rutgers University	Development of Northern Hemisphere Snow and Ice Climate Data Records	Entin	Y	NSIDC
Ian	Joughin	Applied Physics Lab, University of Washington	Greenland Ice Mapping Project: Measuring rapid changes in ice flow	Martin	Y	NSIDC
Eric	Rignot	UC Irvine	Ice Velocity Mapping of the Great Ice Sheets: Antarctica.	Martin	Y	NSIDC
John	Kimball	Flathead Lake Biological Station	An Earth System Data Record for Land Surface Freeze-Thaw State: Quantifying Terrestrial Water Mobility Constraints to Global Ecosystem Processes.	Entin	Y	NSIDC
Robert	Frouin	Scripps Institution of Oceanography, UCSD	A Time Series of Photosynthetically Available Radiation at the Ocean Surface from SeaWiFS and MODIS Data	Bontempi	Y	OCDPS
Stephane	Maritorena	University of California at Santa Barbara	Beyond Chlorophyll: Implementation and Distribution of Innovative Ocean Color Earth Science Data Records.	Bontempi	Y	OCDPS
Richard	Ray	NASA Goddard Space Flight Center	Integrated Multi-Mission Ocean Altimeter Data for Climate Research	Lindstrom	Y	PO.DAAC
Toshio	Chin	Jet Propulsion Laboratory	Multi-sensor Ultra-high Resolution (MUR) global SST field	Lindstrom	Y	PO.DAAC
Robert	Atlas	NOAA	A Cross-Calibrated Multi-Platform Ocean Surface Wind Velocity Data Set for Meteorological and Oceanographic Applications	Lindstrom	Y	PO.DAAC
David	Roy	South Dakota State University	Web-enabled consistent large area Landsat data streams and derived surface characterizations - a MODIS-Landsat data fusion for the terrestrial user community	Wickland	Y	LP DAAC or USGS-EROS
Earth Science Division - Science Mission Directorate						



MEaSURES Projects and Data Centers - Key “Generic” Milestones

Item	Due (months after start)	Comments
KEY MILESTONES		
Establish contact with EOSDIS Data Center(s) where products will eventually be archived	6	Data Center(s) will be designated by Program Manager. Ensure that necessary interface control documents* and operations agreements* are scheduled for development. Data Center will initiate discussions about levels of service, data formats, potential user communities, identify issues unique to the data product/data set.
Deliver Algorithm Theoretical Basis Documents to Program Scientist/Program Manager	12	
Support community review of algorithms (led by Program Scientist)	12	Program Scientists may hold a review meeting with peer reviewers nominated from the science and data management communities
Start production processing of ESDRs	24	
Enter Directory Interchange Format (DIF) document(s) into Global Change Master Directory	27	
Make data publicly available to users via MEaSURES project's web site	27	
EOSDIS Data Center(s) show links to MEaSURES project's web site	27	
Get data products certified by Data Center User Working Groups (DUWGs) and validated by the	36	DUWGs advise EOSDIS Data Centers about relative priority of the data to be archived and distributed by them, and
Start migrating data products, processing source code, documentation, and ancillary data to appropriate EOSDIS Data Center(s) (upon start of production of final version of products)	48	By this time interface testing and end-to-end data flow tests should be completed between the MEaSURES project and the Data Center
Complete migrating data products to EOSDIS Data Center (s)	60	



MEaSURES Information

For more detailed information, see MEaSURES Program Website:

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Thank you!